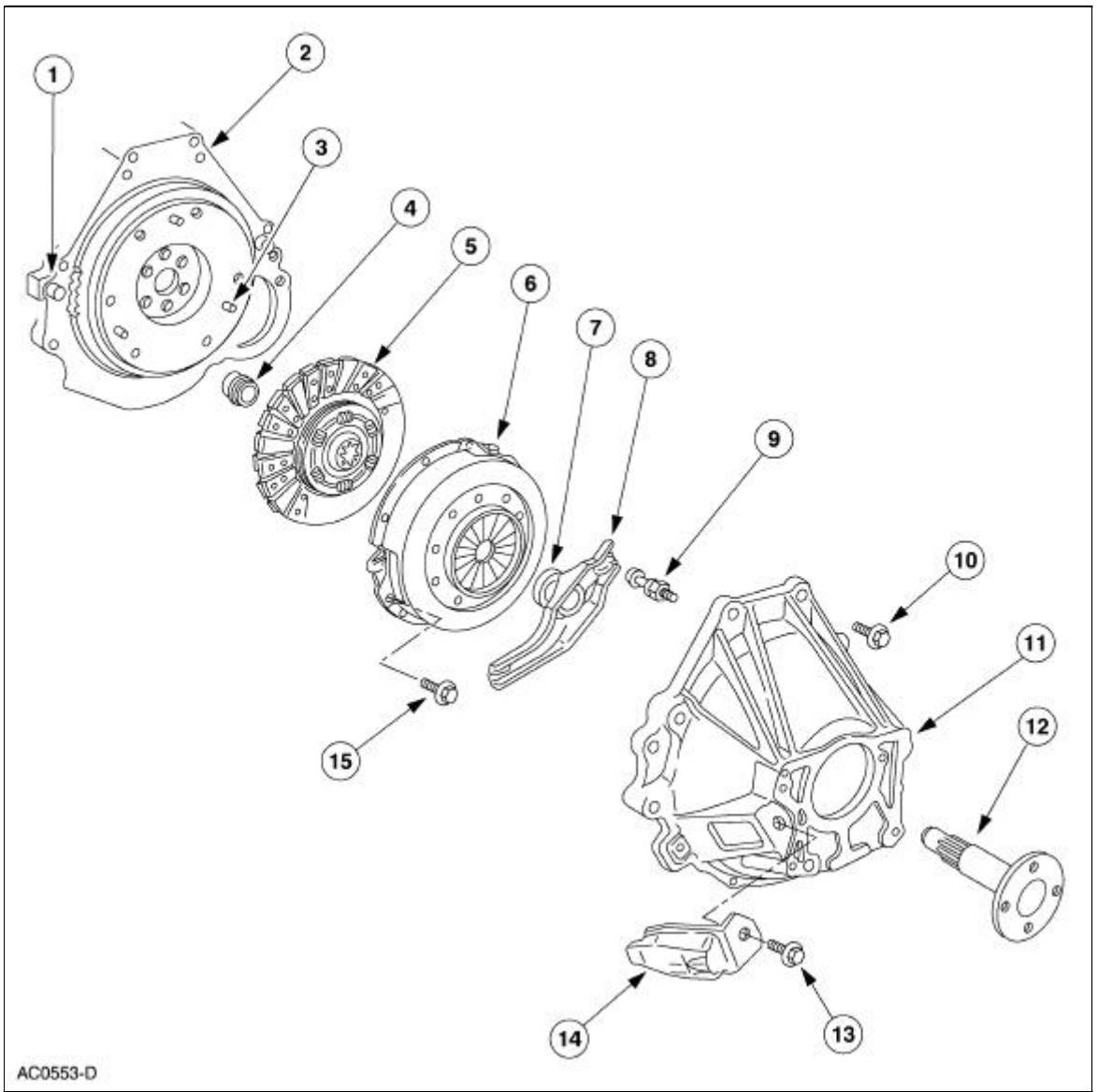
General Specifications

Item	Specification
Pressure plate	
Pressure spring	Belleville
Sensor spring	Belleville
Clutch Disc (3.8L)	
Clutch diameter	280 mm (11.0 inches)
Number of springs	5
Color identification	none
Clutch Disc (4.6L 2V)	
Clutch diameter	280 mm (11.0 inches)
Number of springs	4
Color identification	none
Lubricants (Spec and Capacity) Fluid	
T50D-MERCON® Multi-Purpose ATF Transmission Fluid XT-2-QDX	2.6L (2.8 qt)
TR3650-Synthetic MERCON® (ATF) Transmission Fluid E6AZ-19582-B	3.6L (7.5 pt)

Manual Transmission and Clutch

The primary function of the clutch is to couple and uncouple engine power to the transmission upon driver command. For additional information, refer to Section 308-01 .

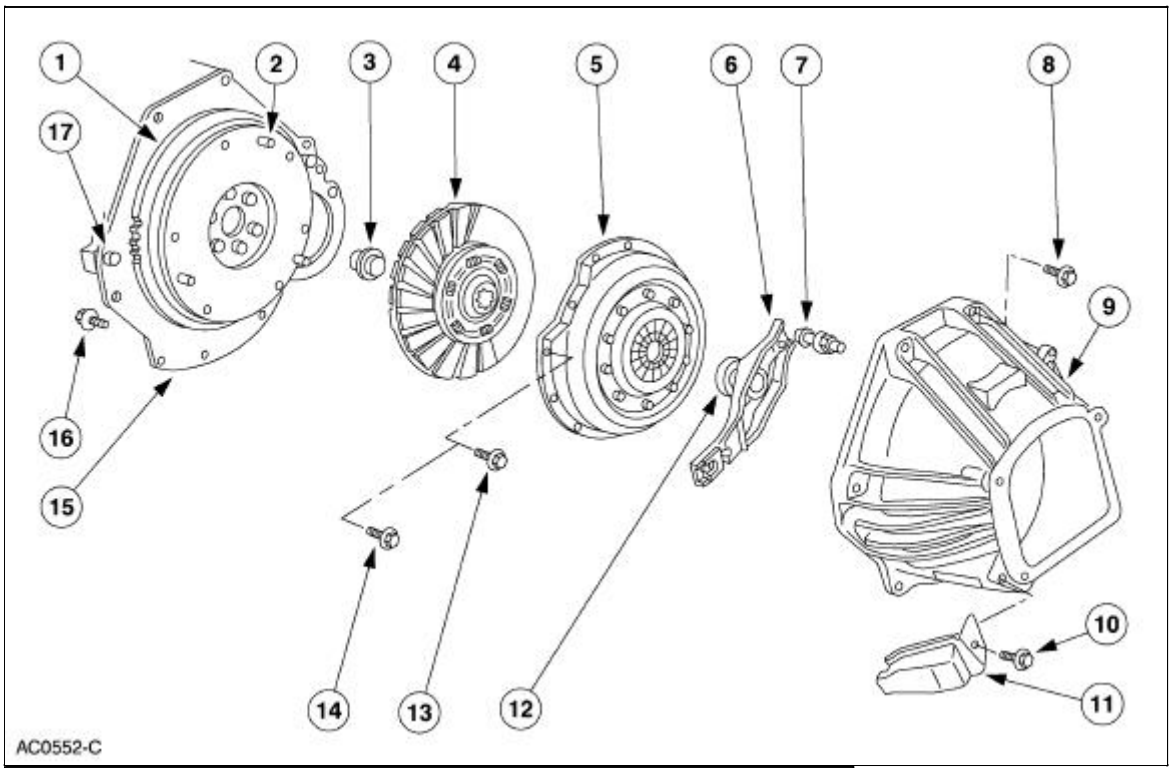
Clutch Disc and Clutch Pressure Plate — 3.8L



Item	Part Number	Description
1	6397	Flywheel housing to block dowel (2 req'd)
2	—	Rear face of block and flywheel (part of 6010)
3	6397	Flywheel to clutch pressure plate dowel (3 req'd)
4	7600	Pilot bearing
5	7550	Clutch disc
6	7563	Clutch pressure plate

7	7548	Clutch release hub and bearing
8	7515	Clutch release lever
9	7B602	Clutch release lever stud
10	N606063-S2	Bolt (6 req'd)
11	6392	Flywheel housing
12	7050	Main drive gear bearing retainer
13	55981-S36M	Bolt
14	7513	Clutch release lever dust shield
15	N807508-S2	Screw and washer assembly

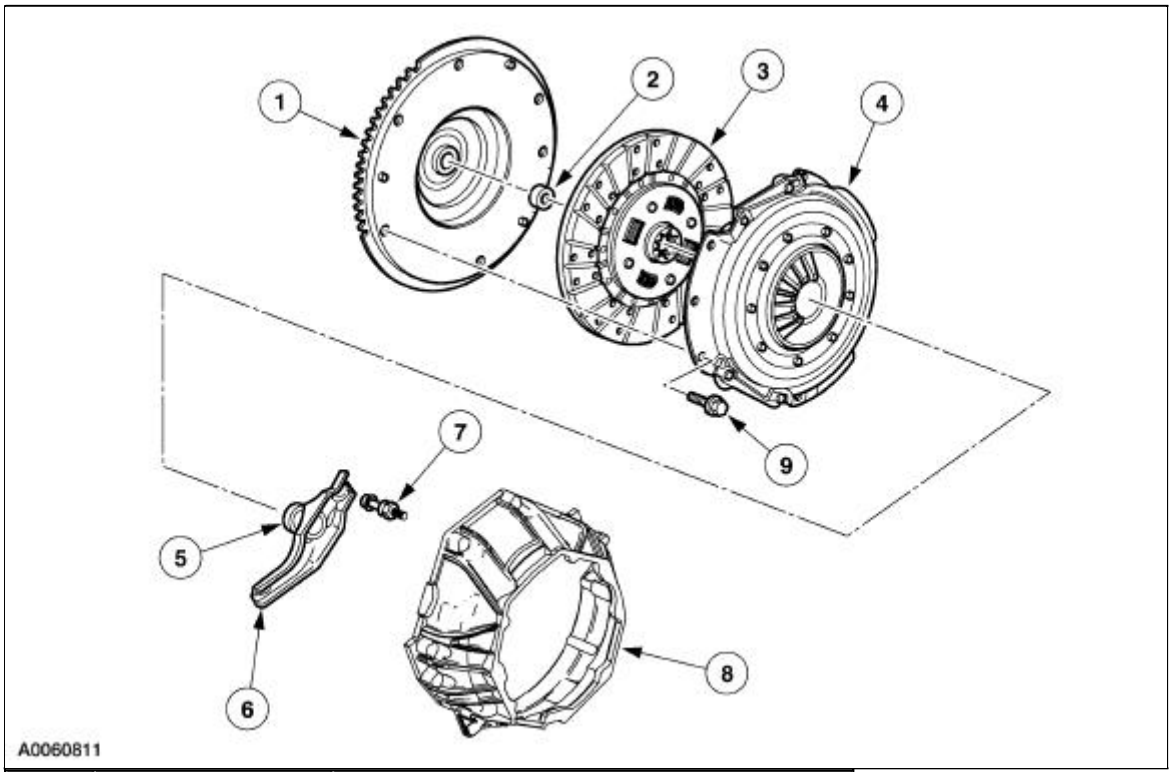
Clutch Disc and Clutch Pressure Plate — 4.6L (2V)



Item	Part Number	Description
1	6375	Flywheel
2	6397	Flywheel to clutch pressure plate dowel (3 req'd)
3	7600	Pilot bearing
4	7550	Clutch disc
5	7563	Clutch pressure plate
6	7515	Clutch release lever
7	7B602	Clutch release lever stud
8	N606063-S2	Bolt (6 req'd)
9	6392	Flywheel housing
10	55981-S36M	Bolt
11	7513	Clutch release lever dust shield

12	7548	Clutch release hub and bearing
13	N808969-S100	Bolt
14	N808969-S100	Bolt (6 req'd)
15	—	Rear face of block and flywheel (part of 6010)
16	—	Bolt (3 req'd)
17	6397	Flywheel housing to block dowel (2 req'd)

Clutch Disc and Clutch Pressure Plate — 4.6L (4V)



Item	Part Number	Description
1	6375	Flywheel
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3	7550	Clutch disc
4	7563	Clutch pressure plate
5	7548	Clutch release hub and bearing
6	7515	Clutch release lever
7	7B602	Clutch release lever stud
8	6392	Flywheel housing
9	N808969-S100	Clutch pressure plate bolt (6 req'd)

- The clutch is a single plate, dry friction clutch disc. The clutch disc has a splined hub with integral torsional springs. The clutch disc hub attaches to the input shaft.
- Engine output is coupled to the transmission input shaft by friction existing between the clutch disc facings and the flywheel/clutch pressure plate assembly. The extent of this friction is directly related to the composition of the facing material and the magnitude of the clamping

forces exerted by the clutch pressure plate and the flywheel on the facings. These factors limit the amount of torque that can be transmitted without slippage.

- The clamping force is obtained from a diaphragm spring contained within the clutch pressure plate assembly. This force is developed during the attachment of the clutch pressure plate assembly to the flywheel.
- The clutch system is disengaged when the clutch pedal is pressed and is accomplished when the release fingers are fully displaced toward the flywheel. This displacement removes the spring load from the clutch pressure plate and eliminates the coupling friction between the engine and the transmission.
- When the clutch pedal is depressed a cable connected to the clutch release lever, hub and bearing actuates the clutch pressure plate diaphragm spring, releasing pressure on the clutch disc. This eliminates the engagement between the transmission and the engine.

Manual Transmission and Clutch

Inspection and Verification

It is important to get an accurate description of the concern before any diagnosis can be carried out. Ask questions as to whether it occurs when hot or cold, during shifting, driving at a particular speed or in a particular gear. If possible, have the customer demonstrate the concern.

- With the vehicle at a complete stop, shift through all the gears and evaluate the noise at different engine rpm. Check for any noises in NEUTRAL at different engine rpm.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• Clutch slippage	• Clutch pedal sticking. • Pressure plate diaphragm spring damaged or weakened. • Clutch pressure plate damaged. • Clutch disc facing damaged or worn excessively. • Clutch disc facing surface hardened or oil-coated. • Clutch release hub and bearing binding. • Flywheel glazed or damaged. • loose pressure plate to flywheel bolts	• Go To Pinpoint Test A .
• Clutch chatter or shudder	• Loose or worn engine mount. • Loose pressure plate to flywheel bolts • Oil on clutch disc facing. • Clutch pressure plate damaged	• Go To Pinpoint Test B .

	or excessive runout. ● Clutch disc facing surface hardened or damaged. ● Flywheel surface glazed or damaged. ● Transmission input shaft eccentric or not perpendicular.	
● Clutch drag	● Clutch drag. ● Cable release linkage outside the flywheel housing worn, cracked, bent. ● Excessive runout or damaged clutch disc. ● Clutch disc splines rusted or worn. ● Loose pressure plate to flywheel bolts.	● Go To Pinpoint Test C .
● Clutch pedal pulsation	● Clutch disc damaged or worn. ● Excessive flywheel runout. ● Loose pressure plate to flywheel bolts. ● Improperly assembled release lever to pivot stud.	● Go To Pinpoint Test D .
● Clutch related vibrations	● Engine component grounding against frame. ● Loose flywheel bolts. ● Excessive flywheel runout. ● Imbalanced clutch pressure plate. ● Accessory drive belt loose or damaged.	● Go To Pinpoint Test E .
● Hard shifting	● Manual transmission concern. ● Loose pressure plate to flywheel bolts.	● Go To Pinpoint Test F .

• Excessive noise	• Pilot bearing worn or damaged. • Excessive crankshaft end play.	• Go To Pinpoint Test G .
• Transmission difficult to shift	• Lubricant.	• ADD or DRAIN AND FILL with specified lubricant.
	• Internal shift mechanism.	• CHECK the internal shift mechanism for smooth operation. REPAIR or INSTALL a new mechanism as necessary.
	• Sliding gears, synchronizers.	• CHECK for free movement of gears and synchronizers. REPAIR or INSTALL new components as necessary.
	• Housings, shaft.	• CHECK for binding condition between the input shaft and the engine crankshaft pilot bearing or bushing. REPAIR or INSTALL new components as necessary. REFER to Section 308-03A or Section 308-03B .
	• Loose pressure plate to flywheel bolts.	• CHECK for loose bolts at the pressure plate. INSTALL new components as necessary. REFER to Section 308-01 .
• **NOTE:** While verifying the condition, determine whether the noise is gear rollover noise, release bearing rub or some other transmission-related noise. Gear rollover noise, inherent in manual transmissions, is caused by the constant mesh gears turning at the engine idle speed while the clutch is engaged and the transmission is in NEUTRAL. Release bearing rub is sometimes mistaken for mainshaft bearing noise. Gear rollover noise will disappear when the clutch is disengaged or when the transmission is engaged in gear.	• Lubricant.	• ADD or DRAIN AND FILL with specified lubricant.

Release bearing rub will disappear when the clutch is engaged. In the event that a bearing is damaged, the noise is more pronounced while engaged in gear under load or coast than in NEUTRAL. Noisy in forward gears	● Components grounding out on the transmission. ● Components housing bolts. ● Bearings or gears.	● CHECK for screws, bolts, etc., of body or other components grounding out. CORRECT as necessary. ● CHECK the torque on the transmission-to-flywheel housing bolts and the flywheel housing-to-engine block bolts. TIGHTEN the bolts to specification. REFER to Section 308-01 . ● INSPECT the bearings. INSPECT the gears and gear teeth for wear or damage. INSTALL new components as necessary. REFER to Section 308-01 .
● Gears clash when shifting from one forward gear to another	● Pilot bearing. ● Gear teeth and/or synchronizer. ● Engine idle speed too high.	● CHECK for a binding condition between the input shaft and the engine crankshaft pilot bearing. INSTALL new components as necessary. REFER to Section 308-01 . ● REPAIR or INSTALL new components as necessary. REFER to Section 308-03A or Section 308-03B . ● REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.
● Transmission jumps out of gear	● Transmission range selector lever boot. ● Transmission-to-engine mounting bolts.	● INSTALL a new boot if exceptionally stiff. REFER to Section 308-03A or Section 308-03B . ● TIGHTEN the bolts to specification.

	• Crankshaft pilot bearing. • Internal damage. • Gear teeth.	• INSTALL a new bearing. • INSPECT the synchronizer sleeves for free movement on their hubs. INSPECT the synchronizer blocking rings for widened index slots, rounded clutch teeth and smooth internal surface. CHECK countershaft cluster gear for excessive end play. CHECK shift forks for worn or loose mounting on shift rails. INSPECT the synchronizer sliding sleeve and the gear clutch teeth for wear or damage. REPAIR or INSTALL a new component as necessary. • If worn or damaged, INSTALL new gears. REFER to Section 308-03A or Section 308-03B .
• Transmission will not shift into one gear—all others OK	• Manual shift linkage. • Backup switch ball. • Internal components.	• REPAIR or INSTALL new components as necessary. • If REVERSE is the problem, CHECK backup switch for ball frozen in extended position. • INSPECT the shift rail and fork system, synchronizer system and the gear clutch teeth for restricted travel. REPAIR or INSTALL new components as necessary.
• Transmission is locked in one gear and cannot be shifted out of that gear	• Internal components. • Fork on rail.	• INSPECT the problem gears, shift rails, forks and the synchronizer for wear or damage. REPAIR as necessary. REFER to Section 308-03A or Section 308-03B . • CHECK the shift rail interlock system. REFER to Section 308-03A or Section 308-03B .
• Transmission leaks	• Lubricant.	• CHECK the level and type.

	• Other component leaking.	• IDENTIFY leaking fluid as engine, power steering, or transmission fluid. REPAIR as necessary.
	• False report.	• REMOVE all traces of lube on the exposed transmission surfaces. CHECK the vent for free breathing. OPERATE the transmission and INSPECT for new leakage. REPAIR as necessary. REFER to Section 308-03A or Section 308-03B.
	• Internal components.	• INSPECT for leaks at the input shaft bearing retainer seal and the shift rail expansion plug. REFER to Section 308-03A or Section 308-03B. INSPECT for leaks at the top cover gasket. INSPECT the case for sand holes or cracks. REPAIR or INSTALL a new case as necessary. REFER to Section 308-03A or Section 308-03B.
	• Fill and drain plugs.	• CHECK fill and drain plugs and bore threads. REPAIR as necessary. TIGHTEN plugs to specified torque value. REFER to Section 308-03A or Section 308-03B.
• Bearing failure	• Other part failure. • Raceways or rollers. • Lubricant. • Towing vehicle further than 80 km (50 miles) with driveshaft installed. Mainshaft tapered bearing and needle caged bearings are especially susceptible to damage.	• REMOVE, DISASSEMBLE and CLEAN the transmission. Inspect for damaged parts and install new components as necessary. (Note: RESET the bearing preload if any new tapered bearings are installed). REFER to Section 308-03A or Section 308-03B.
	• Vibration break-up of retainer and brinelling of races. • Bearing(s).	• DETERMINE the cause of vibration and CORRECT. Otherwise PROCEED as above.

	• Shafts or bore. • Overloading of vehicle. • Incorrect preload.	
	• Input shaft oil dam.	• Install new components as necessary and verify the oil dam installation is correct. REFER to Section 308-03A or Section 308-03B. CHECK for correct installation of the snap ring on the mainshaft next to the oil dam.
	• Oil baffle in the input bearing shim pack.	• INSTALL a new oil baffle, making sure it is not damaged during assembly. REFER to Section 308-03A or Section 308-03B.

Pinpoint Tests

PINPOINT TEST A: CLUTCH SLIPPAGE

Test Step	Result / Action to Take
A1 INSPECT THE CLUTCH LINKAGE	
• Key in OFF position. • Block the wheels and apply the parking brake. • Depress and slowly release the clutch pedal. • **Does the clutch pedal release without binding?**	**Yes** GO to A2. **No** INSPECT the clutch pedal. REFER to Section 308-02.
A2 CARRY OUT A STALL TEST	
• Key in START position. • Block the wheels and apply the parking brake. • Place the transmission in fourth gear. • Increase the engine speed to 2000 rpm and slowly release the clutch pedal. • **Does the engine stall within five seconds?**	**Yes** The clutch is not slipping. VERIFY the customer concern. **No** INSPECT the clutch components for damage.

PINPOINT TEST B: CLUTCH CHATTER OR SHUDDER

Test Step	Result / Action to Take
B1 CHECK ENGINE OR TRANSMISSION MOUNTS	
• Inspect all the engine and transmission mounts for looseness or damage. Refer to Section 303-01A or Section 303-01B and Section 308-03A or Section 308-03B. • **Are any of the engine or transmission mounts**	**Yes** TIGHTEN or INSTALL new engine mounts or transmission mounts. TEST the system for normal operation.

loose or damaged?	**No** GO to B2 .
B2 INSPECT PRESSURE PLATE BOLTS	
• Inspect the pressure plate-to-flywheel bolts. • **Are any of the pressure plate-to-flywheel bolts loose?**	**Yes** TIGHTEN or INSTALL new bolts. REFER to Section 308-01 . TEST the system for normal operation. **No** GO to B3 .
B3 INSPECT PRESSURE PLATE	
• Remove the clutch pressure plate. Refer to Section 308-01 . • Inspect the clutch pressure plate. Refer to Pressure Plate Check . • **Are any signs of damage present on the clutch pressure plate?**	**Yes** INSTALL a new clutch pressure plate. REFER to Section 308-01 . TEST the system for normal operation. **No** GO to B4 .
B4 CHECK CLUTCH DISC	
• Carry out the clutch disc inspection procedure. Refer to Disc Check . • **Is the clutch disc OK?**	**Yes** GO to B5 . **No** INSTALL a new clutch disc. REFER to Section 308-01 . TEST the system for normal operation.
B5 INSPECT THE FLYWHEEL	
• Inspect the flywheel for damage and runout. Refer to Flywheel Runout Check . • **Is the flywheel OK?**	**Yes** GO to B6 . **No** REPAIR or INSTALL a new flywheel as necessary. REFER to Section 308-01 . TEST the system for normal operation.
B6 INSPECT THE INPUT SHAFT	
• INSPECT the input shaft for signs of wear or damage. • **Are any signs of wear or damage present on the input shaft?**	**Yes** INSTALL a new input shaft. REFER to Section 308-03A or Section 308-03B . **No** VERIFY the customer concerns. GO to Symptom Chart if necessary.

PINPOINT TEST C: CLUTCH DRAG

Test Step	Result / Action to Take
C1 CHECK HIGH SHIFTING EFFORTS	
• Key in START position. • Set parking brake. • With the shift control selector in REVERSE,	**Yes** Clutch system OK. **No**

clutch disengaged and engine idling, move the shift lever to a position halfway between REVERSE and NEUTRAL. ● Slowly engage clutch. The transmission will behave as if it is in NEUTRAL. ● Gear clash can now be heard if an attempt is made to shift into REVERSE with the clutch engaged. Reserve can now be measured. ● While maintaining light pressure on the shift selector, slowly press the clutch pedal to the floor. The gear clash will stop and the shift selector will slide into the REVERSE position. ● **Is there a minimum 19.05 mm (0.750 inch) clutch pedal reserve?**	CHECK the clutch pressure plate and clutch disc. INSTALL a new clutch pressure plate or clutch disc if necessary. REFER to Section 308-01 . TEST the system for normal operation.

PINPOINT TEST D: CLUTCH PEDAL PULSATION

Test Step	Result / Action to Take
D1 CHECK THE CLUTCH PEDAL PULSATION	
● Key in START position. ● With the transmission in NEUTRAL, slowly press the clutch pedal. ● **Does the clutch pedal pulsate while being pressed?**	**Yes** GO to D2 . **No** VERIFY customer concern. GO to Symptom Chart if necessary.
D2 INSPECT PRESSURE PLATE BOLTS	
● Inspect the pressure plate-to-flywheel bolts. ● **Are any of the pressure plate-to-flywheel bolts loose?**	**Yes** TIGHTEN or INSTALL new bolts. REFER to Section 308-01 . TEST the system for normal operation. **No** GO to D3 .
D3 INSPECT THE CLUTCH PRESSURE PLATE	
● Remove the clutch pressure plate. Refer to Section 308-01 . ● INSPECT the clutch pressure plate for damage. Refer to Pressure Plate Check . ● **Are there any signs of damage present on the clutch pressure plate?**	**Yes** INSTALL a new clutch pressure plate. REFER to Section 308-01 . TEST the system for normal operation. **No** GO to D4 .
D4 INSPECT THE CLUTCH DISC	
● Carry out the clutch disc inspection procedure. Refer to Disc Check . ● **Is the clutch disc OK?**	**Yes** GO to D5 . **No** INSTALL a new clutch disc. REFER to Section 308-01 . TEST the system for normal operation.
D5 INSPECT THE FLYWHEEL	

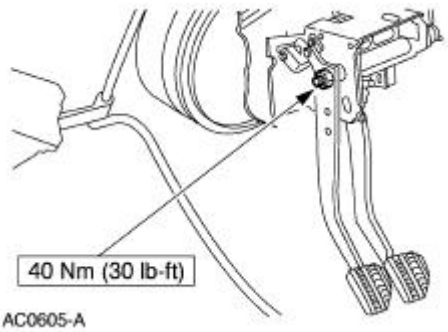
• Inspect the flywheel for damage and runout. Refer to Flywheel Runout Check . • **Is flywheel OK?**	**Yes** GO to D6 . **No** TIGHTEN, RESURFACE or INSTALL a new flywheel as necessary. REFER to Section 308-01 . TEST the system for normal operation.
D6 INSPECT RELEASE LEVER INTERFACE TO PIVOT STUD	
• Inspect the release lever and the pivot stud for damage or misalignment. • **Are there any signs of damage present or misalignment between the release lever and pivot stud?**	**Yes** INSTALL a new pivot stud and release lever. REFER to Section 308-01 . TEST the system for normal operation. **No** VERIFY customer concern. GO to Symptom Chart if necessary.

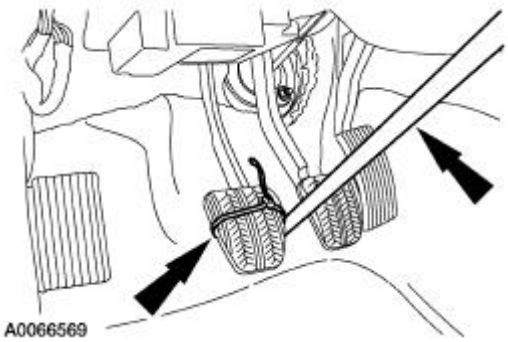
PINPOINT TEST E: CLUTCH RELATED VIBRATIONS

Test Step	Result / Action to Take
E1 CHECK FOR ENGINE COMPONENT GROUNDING	
• Raise the vehicle on a hoist. Refer to Section 100-02 . • Check the engine and transmission mounts for grounding. • Check for exhaust manifolds or other engine component grounding on the body or frame. • **Is there evidence of grounding on the body or frame?**	**Yes** REPAIR the components as necessary. TEST the system for normal operation. **No** GO to E2 .
E2 CHECK FOR ACCESSORY DRIVE VIBRATIONS	
• Key in START position. • Remove the accessory drive belt. • **Does the vibration stop when the accessory drive belt is removed from the engine?**	**Yes** REFER to Section 303-05 to diagnose the accessory drive belt components. **No** STOP the engine and INSTALL the drive belt. GO to E3 .
E3 CHECK FOR RELEASE BEARING NOISE	
• Key in START position. • Depress and hold the clutch pedal. • **Is a whirring, grating, or grinding noise present only when pedal is pushed?**	**Yes** INSTALL a new clutch release hub and bearing. REFER to Section 308-01 . **No** GO to E4 .
E4 INSPECT THE FLYWHEEL	
• Key in OFF position. • Remove the transmission. Refer to Section 308-03A or Section 308-03B . • Carry out a flywheel check. Refer to Flywheel Runout Check .	**Yes** VERIFY customer concern. GO to Symptom Chart if necessary. **No**

• **Is the flywheel OK?**	TIGHTEN, RESURFACE or INSTALL a new flywheel. REFER to Section 308-01 . TEST the system for normal operation.

PINPOINT TEST F: HARD SHIFTING

Test Step	Result / Action to Take
F1 CHECK THE CLUTCH RELEASE CABLE	
• **NOTE:** Check the upper shift boot for twisting. • **NOTE:** Check the engine idle speed. • Inspect the clutch release cable for wear or damage. Make sure the clutch release cable is correctly routed and that all the fasteners are installed. • **Are there any fasteners missing or is the cable worn, damaged or incorrectly routed?**	**Yes** REPAIR or INSTALL a new clutch release cable as necessary. TEST the system for normal operation. **No** GO to F2 .
F2 CHECK THE CLUTCH PEDAL	
• Loosen the clutch pedal shaft nut. • Lift the clutch pedal to the most upward position. • While holding the clutch pedal in the most upward position, tighten the nut.  • **Was the clutch pedal incorrectly adjusted?**	**Yes** VERIFY customer concern. TEST the system for normal operation. **No** GO to F3 .
F3 CHECK THE CLUTCH PEDAL QUADRANT	
• Pull up on the clutch pedal to the upstop. Pulling up on the pedal ensures that the quadrant is free to rotate through it's complete range of motion against the spring load of the quadrant. • **Is the clutch pedal quadrant binding?**	**Yes** INSTALL a new quadrant. TEST the system for normal operation. **No** GO to F4 .
F4 MEASURE THE CLUTCH RESERVE	
NOTE: Do not check the clutch system after the road test. Allow the vehicle to cool down before carrying out the clutch reserve check. **NOTE:** Remove the floor mat, if equipped, to allow the clutch pedal to travel to the downstop. • Install a cable tie to the lower clutch pedal, than attach a tape measure to the cable tie.	**Yes** INSTALL a new pressure plate and clutch disc. REINSTALL the transmission. RECHECK the clutch reserve. TEST the system of normal operation. **No** GO to F5 .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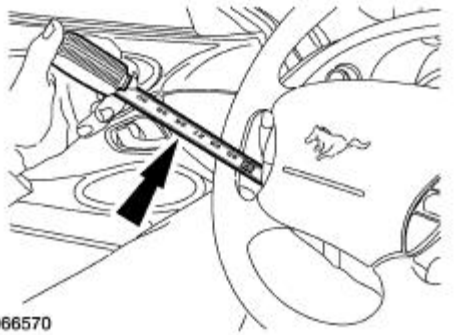
- Pull the tape measure up to the steering wheel. Position it through the steering wheel opening.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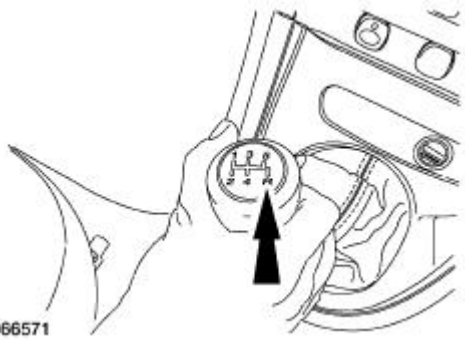
- Depress the clutch fully and start the vehicle.
- Shift the transmission into reverse gear, then move the shift lever forward to the position in between reverse gear and neutral. Slowly release the clutch pedal (if the vehicle creeps rearward, move the shift lever forward a little more). The transmission will behave as if in neutral, but the reverse gear synchronizer will be bypassed.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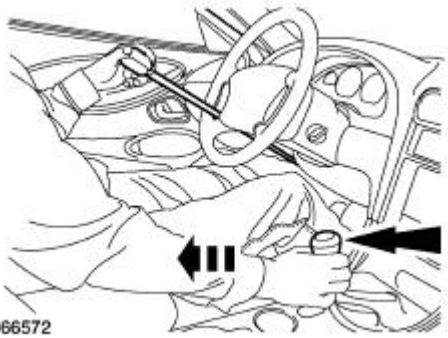
- With the clutch pedal up, gently pull the shift lever toward the reverse gear position. Gear clash can now be heard.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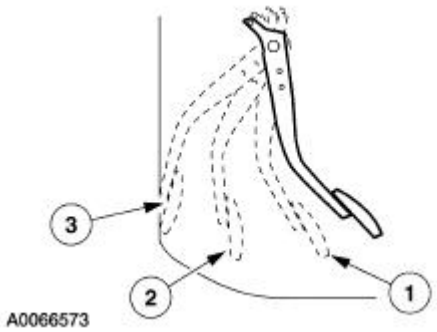
- Slowly depress the clutch pedal. Using the steering wheel inner seam as a reference, note the measurement when the gear clash stops or the shift lever slides into reverse gear. Depress the clutch pedal to the downstop. The difference between the measurement taken when the gear clash

stopped and the measurement taken at the downstop is the clutch reserve.

Item	Pedal Position
1	Gear clash begins
2	Gear clash ends
3	Clutch pedal downstop



- **Is the clutch reserve less than 19 mm (0.75 inch)?**

F5 INSPECT THE RELEASE LEVER AND PIVOT STUD

- Remove the transmission.
- Inspect the release lever and the pivot stud for wear, damage or misalignment.
- **Is the release lever or pivot stud worn, damaged or misaligned?**

Yes
INSTALL a new release lever or pivot stud as necessary. TEST the system for normal operation.

No
GO to F6 .

F6 INSPECT THE RELEASE BEARING

- Inspect the release bearing for wear or damage. Make sure the release lever is seated in the release bearing pocket.
- **Is the release bearing worn or damaged?**

Yes
INSTALL a new release bearing. TEST the system for normal operation.

No
GO to F7 .

F7 INSPECT THE PILOT BEARING

- Inspect the pilot bearing for wear or damage.
- **Is the pilot bearing worn or damaged?**

Yes
INSTALL a new pilot bearing. TEST the system for normal operation.

No
GO to F8 .

F8 INSPECT THE CLUTCH PRESSURE PLATE TO FLYWHEEL BOLTS

- Measure the clutch pressure plate to flywheel bolts.
- **Is the bolt torque greater than or equal to 65 Nm (48 lb-ft)?**

Yes
INSTALL a new pressure plate and clutch disc. Note the condition of the removed components (wear, damage or oil contamination). For oil

	contamination, REPAIR as necessary. TEST the system for normal operation. If the transmission is still hard to shift, GO to F9 . **No** TIGHTEN the bolts to 80 Nm (59 lb-ft). TEST the system for normal operation. If the transmission is still hard to shift, GO to F9 .
F9 INSPECT THE TRANSMISSION	

• Remove the transmission.
• Disassemble the transmission. Refer to Section 308-03B .
• Carry out the following:
  ◦ inspect all the shift rails for excessive scuffing or wear.
  ◦ check the interlock pins on the shift rail.
  ◦ make sure the interlock bolts are tighten to 31 Nm (23 lb-ft).
  ◦ inspect the shift pads for wear or cracking.
  ◦ inspect the shift forks for wear or damage.
  ◦ check the synchronizer rings (of the affected gear[s]) for wear or damage.
  ◦ check the synchronizer hubs (of the affected gear[s]) for wear or damage.
  ◦ inspect the clutching teeth of the affected gear.
• **Are there any internal components worn or damaged?**
	Yes
	INSTALL new components or REPAIR as necessary. TEST the system for normal operation.
	
	No
	ASSEMBLE and INSTALL the transmission. TEST the system for normal operation.

PINPOINT TEST G: EXCESSIVE NOISE

Test Step	Result / Action to Take
G1 TRANSMISSION NEUTRAL GEAR ROLLOVER TEST	
• Start the engine and let it idle with the transmission in neutral and the clutch engaged (pedal up). If noise is excessive, depress the clutch pedal to stop the transmission input shaft from rotating. • **Does the noise stop when the clutch pedal is depressed?**	**Yes** INSPECT the clutch component for damage. REFER to General Procedures in this section. **No** GO to G2 .
G2 CHECK THE PILOT BEARING	
• Inspect the pilot bearing for damage. Refer to Bearing . • **Is the pilot bearing OK?**	**Yes** GO to G3 . **No** INSTALL a new pilot bearing. REFER to Section 308-01 .
G3 CHECK TORSION SPRINGS	
• Inspect the torsion springs for fatigue or breakage. • **Are there any signs of fatigue or breakage?**	**Yes** INSTALL a new clutch disc. REFER to Section 308-01 . TEST the system for normal operation.

	No INSPECT the crankshaft end play. REFER to Section 303-01A or Section 303-01B .

Disc Check

Special Tool(s)

ST1131-A	Brake/Automobile Brake Drum System with Vacuum 164-R3622 or equivalent
ST1266-A	Dial Indicator/Magnetic Base 100-D002 (D78P-4201-B) or equivalent

WARNING: Dust and dirt present on wheel brake and clutch assemblies may contain asbestos fibers that are hazardous to health when made airborne by cleaning with compressed air or by dry brushing. Failure to follow these instructions may result in personal injury.

WARNING: Wheel brake assemblies and clutch facings should be cleaned using a vacuum cleaner recommended for use with asbestos fibers such as the brake automobile brake drum system with vacuum. Dust and dirt from the vacuum should be disposed of in a manner that prevents dust exposure such as sealed bags. The bag must be labeled according to OSHA instructions and the trash hauler notified as to the bag's contents. Failure to follow these instructions may result in personal injury.

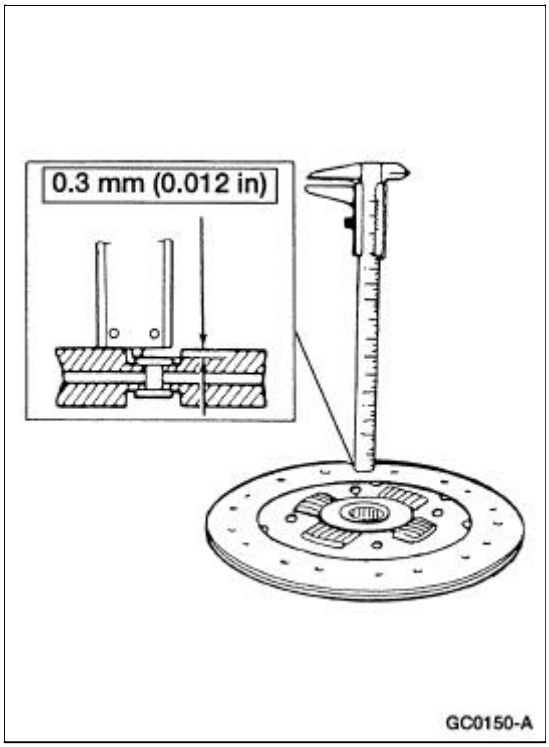
WARNING: If a vacuum suitable for asbestos is not available, cleaning should be done wet. If dust generation is still possible, technicians should wear government-approved toxic dust purifying respirators. Failure to follow these instructions may result in personal injury.

WARNING: Grinding or sanding on the brake linings, pads, rotors, drums or clutch facings should be done only while using correct exhaust-ventilated equipment. Failure to follow these instructions may result in personal injury.

WARNING: OSHA requires areas where asbestos dust generation is possible to be isolated and posted with warning signs. Only technicians concerned with carrying out brake or clutch service should be present in the area. Failure to follow these instructions may result in personal injury.

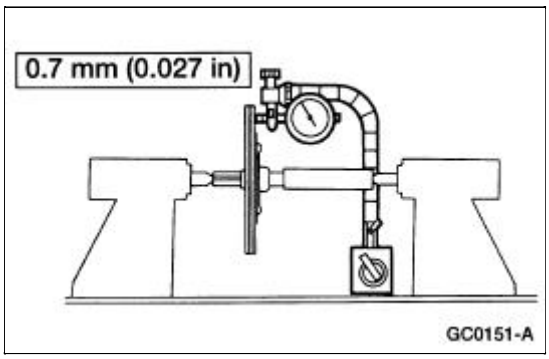
1. Check the clutch disc lining surface for hardening or the presence of oil.

2. Check for a worn clutch disc lining. Measure the minimum allowable depth to the rivet heads with a slide caliper.

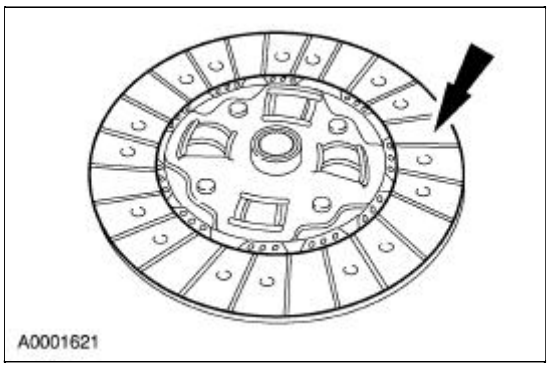


3. Check for loose clutch disc lining rivets.

4. Use the special tool to check the maximum allowable runout of the clutch disc.



5. Use an emery cloth to remove minor imperfections in the clutch disc lining surface.



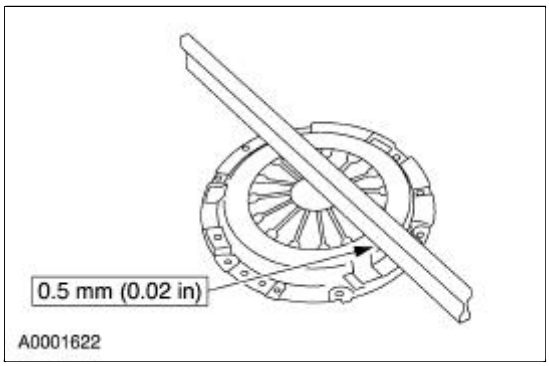
6. Check for wear or rust on the splines. If necessary, clean them with an emery cloth.

7. Check the clutch disc (7550) for cracking, scoring, discoloration or other surface marks. Install a new clutch disc as necessary.

Pressure Plate Check

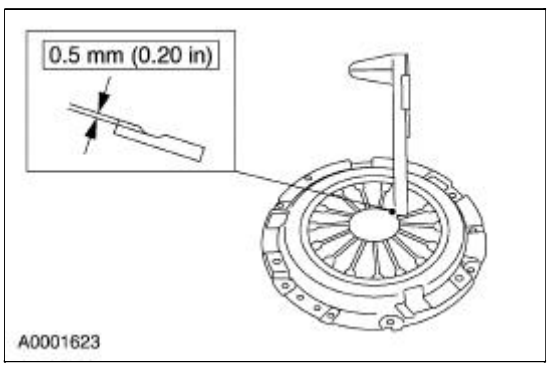
1. Check the clutch pressure plate surface for scoring, cracks or discoloration. Minor scratches or discoloration should be removed with a fine emery cloth.

2. Measure the flatness of the clutch pressure plate surface with a straightedge and a feeler gauge.



3. Check the diaphragm spring fingers for discoloration, scoring, bent or broken segments and spring ends that are higher or lower than the rest.

4. Measure the wear of the diaphragm spring fingers.



Flywheel Check

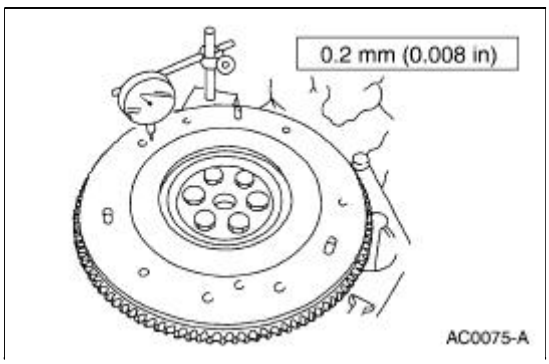
1. Check the flywheel surface for scoring, cracks or discoloration. Minor scratches or discoloration should be removed with a fine emery cloth.

Flywheel Runout Check

Special Tool(s)

ST1266-A	Dial Indicator/Magnetic Base 100-D002 (D78P-4201-B) or equivalent

1. Mount the special tool so that the indicator contact point rides on the clutch disc contact surface.
2. Turn the flywheel (6375); if the runout exceeds the maximum allowance, install a new flywheel.

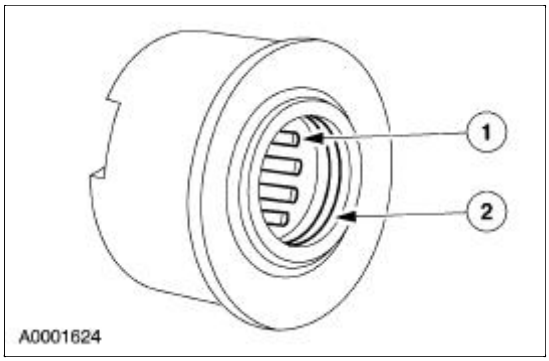


Bearing

1. **CAUTION: The pilot bearing is a sealed bearing and must not be immersed in any type of cleaning fluid.**

   Inspect the pilot bearing (7118) for:
   1. needle rollers for scoring, worn or broken rollers, cracked roller cage inadequate grease or discoloration.
   2. seal leakage.

   - misalignment and looseness in the crankshaft.

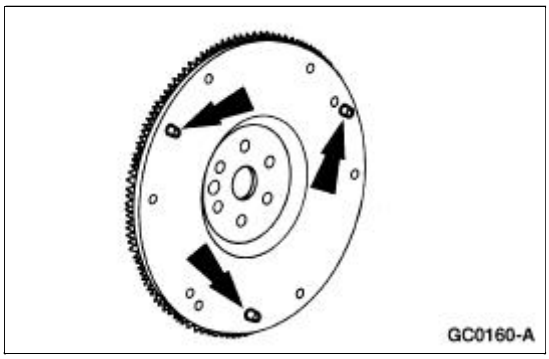


Dowels —Flywheel

Removal

1. **NOTE:** Take care not to damage the flywheel dowel holes or the surface areas around the flywheel dowel during removal.

   Remove the flywheel dowels by using a drift pin where the flywheel dowel is installed in an open hole and a pair of locking pliers where the flywheel dowel is installed in a blind hole.



Installation

1. **NOTE:** Care should be taken to drive the flywheel dowel squarely into place until it is fully seated and to not damage the surrounding surface areas.

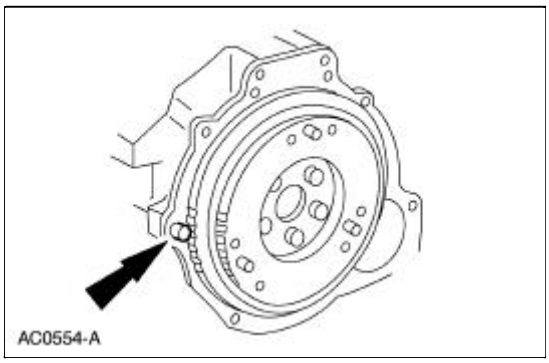
   Install all flywheel dowels by driving them into place using a brass or plastic mallet.

Dowels —Flywheel Housing to Block

Removal

1. **NOTE:** Take care not to damage the flywheel housing to block dowel holes or the surface areas around the flywheel housing to block dowel hole during removal.

   Remove the two flywheel housing to block dowels using a drift pin where the flywheel housing to block dowel is installed in an open hole and a pair of locking pliers where the flywheel housing to block dowel is installed in a blind hole.



Installation

1. **NOTE:** Care should be taken to drive the flywheel housing to block dowel squarely into place until it is fully seated without damaging the surrounding surface areas.

   Install all flywheel housing to block dowels by driving them into place using a brass or plastic mallet.